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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,408	01/26/2006	Masaki Higurashi	IPO-P1965	5715

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VOLPE AND KOENIG, P.C.
UNITED PLAZA, SUITE 1600
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103

EXAMINER	
ENTEZARI, MICHELLE M	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,408	HIGURASHI ET AL.	
	Examiner	Art Unit	
	MICHELLE ENTEZARI	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 6/9/09.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/16/09; 3/24/09; 6/22/09*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 14-52 were previously withdrawn. Claims 2, 12, and 13 are canceled. Claims 1 and 3-11 are pending.

Response to Arguments

2. Applicant's arguments, see p 17, filed June 09, 2009, with respect to claims 12 and 13 have been fully considered and are persuasive, as these claims have been canceled. In view of their cancellation, the 35 USC 101 rejection of claims 12 and 13 has been withdrawn.

3. Applicant's arguments, see p 17, filed June 09, 2009, with respect to claim 6 have been fully considered and are persuasive, as this claim has been amended. In view of the amendment, the 35 USC 112 rejection of claim 6 has been withdrawn.

4. Applicant's arguments with respect to the prior art rejections of claims 1-11 have been considered but are moot in view of the new ground(s) of rejection.

5. In response to the argument on page 19 that Gallagher does not disclose determining image range to perform the correction, Gallagher discloses that preferably output image has same number of rows and columns as input image, and if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default

value ([0027]), since value is set to a default if it falls outside of a given range, it indicates the range is being determined.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. **Claims 1, 3, 4, and 5 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher (US 2003/0215230 A1) in view of Suda (US 20020122124 A1) in view of Nako (US 5940544 A).

Regarding claim 1, Gallagher discloses an image processing apparatus (imaging system, [0009], shown with CPU in fig. 4) comprising a distortion correcting unit (system for correcting distortion, [0010], processor, [0039]), the image processing apparatus further comprising a distortion correcting range calculating unit that calculates an input image range (preferably output image has same number of rows and columns as input image, if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default value, [0027]; distortion model governs the mapping of locations of the output image to locations in the input image, [0028], [formula to find xo, yo, included in

[0028]]; since value is set to a default if it falls outside of a given range, it indicates the range is being determined). Gallagher further discloses the distortion correcting range calculating unit comprises: a coordinate generating unit that generates interpolation coordinates (the value of the pixel o(mo, no) [coordinate] is determined by interpolating the value from the pixel values nearby i(xo, yo), [0027]); a distortion-correction coordinate transforming unit (output image is generated by the distortion corrector, [0027], distortion model to map output image locations (m, n) to locations x, y of input image, [0028]); and a correcting range detecting unit that calculates input image range from the transformed coordinate position (preferably output image has same number of rows and columns as input image, if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default value, [0027]; distortion model governs the mapping of locations of the output image to locations in the input image, [0028], [formula to find xo, yo, included in [0028]] since value is set to a default if it falls outside of a given range, it indicates the range is being determined).

Gallagher does not explicitly disclose the input image range for distortion correction processing performed by the distortion correcting unit. However, as a distortion model governs the mapping of locations of the output image to locations in the input image ([0028], [formula to find xo, yo, included in [0028]]), and a matching is occurring between the range of coordinates of the input and output image (if i(xo, yo) falls outside the range of the image i(x,y), then value of o(mo, no) is set to a default value, [0027]; since value is set to a default if it falls outside of a given range, it indicates the range is

being determined), it would be obvious at the time of the invention to one of ordinary skill in the art that in finding this input image range, and the input image is corrected for distortion, the distortion correction range is also being determined.

Gallagher also does not explicitly disclose a distortion-correction coordinate transforming unit that outputs a coordinate transformed by applying a predetermined distortion correcting formula to the generated interpolation coordinate, or sequentially performing distortion correction processing in units of block image data obtained by dividing an image data.

Suda teaches a distortion-correction coordinate transforming unit that outputs a coordinate transformed by applying a predetermined distortion correcting formula to the generated interpolation coordinate (interpolation to correct misregistration, [0130]; subsequent distortion correction, [0131]).

Gallagher and Suda are in the similar art of correcting image distortion (Gallagher, title, Suda, [0131], [0136]). It would have been obvious at the time of the invention to one of ordinary skill in the art to substitute the sequential interpolation and distortion correction as taught by Suda for the distortion correction that is also interpolation as taught by Gallagher, because when taking images with a photographing lens, Suda states the reason this interpolation is done before distortion correction, is that due to shifts of object images caused by expansion or shrinkage of the photographing lens, the

direction of misregistration has deviated from that parallel to the plane of the paper after distortion correction, and interpolation cannot be implemented by simple arithmetic ([0136]).

Gallagher and Suda do not explicitly disclose sequentially performing distortion correction processing in units of block image data obtained by dividing an image data.

Nako teaches sequentially performing distortion correction processing in units of block image data obtained by dividing an image data, as Nako teaches subdividing the picture into multiple blocks (col. 13, lines 60-65) and then performing distortion correction by enlarging the picture (col. 14, lines 15-20), wherein the magnification is done with respect to each column of pixels (col. 14, lines 35-40), and where the column dependent processing is executed with respect to a series of pixels as a unit, which pixels are aligned with a specific direction, in the direction of picture correction (col. 18, lines 25-35).

Gallagher, Suda, and Nako are in the similar art of distortion correction (Gallagher, title, Suda, [0131], [0136], Nako, title). It would have been obvious at the time of the invention to one of ordinary skill in the art to process blocks before correction as taught by Nako with the invention of Gallagher and Suda, as this would be one of a limited number of ways to process data, would have been obvious to try, and by processing blocks would have a predictable time savings.

Regarding claim 3, Gallagher and Suda disclose the image processing apparatus according to claim 1. Gallagher and Suda do not explicitly disclose the coordinate generating unit generates the interpolation coordinates by using only coordinate positions corresponding to pixels of a peripheral portion of a side of an output image range after distortion correction processing.

Nako teaches a height calculation section calculates from the edge a height of the document, and subsequently a distortion correction section corrects a distortion by magnification/reduction of the picture rotated by the rotation correction section on the basis of the document height and the magnification (abstract). This indicates the correction is being performed based on the edges.

Though Nako does not explicitly teach using only these pixels on the edges exclusively, in the explanation that these peripheral pixels are the pixels causing these major distortions when imaging books, it would have been obvious at the time of the invention to one of ordinary skill in the art to use these pixels exclusively in the mapping, as this would reduce computation time.

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the rectangular input image and using only coordinates regarding the sides

with the invention of Gallagher and Suda because as taught by Nako, skew can be detected based on the edges (abstract).

Regarding claim 4, Gallagher, Suda, and Nako disclose the image processing apparatus according to claim 3.

Nako further teaches a rectangular paper (col. 8, lines 65-68), in which a height calculation section calculates from the edge a height of the document, and subsequently a distortion correction section corrects a distortion by magnification/reduction of the picture rotated by the rotation correction section on the basis of the document height and the magnification (abstract). This indicates the correction is being performed based on the edges.

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the rectangular input image with the invention of Gallagher and Suda, because as taught by Nako, in the case of determining skew in order to correct distortion in documents, the start image from which these skew values are being derived from will generally be rectangular (col. 8, lines 65-68).

Regarding claim 5, Gallagher, Suda, and Nako disclose the image processing apparatus according to claim 4.

Nako further teaches selecting an appropriate processing area in accordance with the skew (col. 5, lines 35-40), wherein a skew detection means determines a maximal and minimal point from among the edges to detect the skew angle (col. 5, lines 50-55). Because the processing range is changed in accordance with skew, and skew is determined using the maximum and minimum of the sides (edges), this shows the range calculation in this instance is based on maximum and minimum values of the coordinates of the pixels corresponding to the four sides of the output image range.

8. **Claims 6 and 8-11 are** rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher (US 2003/0215230 A1) and Suda (US 20020122124 A1) and Nako (US 5940544 A) as applied to claim 1 above, further in view of Song (US 20020164083 A1).

Regarding claim 6, Gallagher and Suda and Nako disclose the image processing apparatus according to claim 1.

Gallagher and Suda and Nako do not explicitly disclose the distortion-correction coordinate transforming unit performs the calculation included in the predetermined correcting formula on time-series data.

Song teaches a controller for interpolating the image stored in the first frame memory on a real time basis and prewarping it by using the distortion correction information stored

in the distortion correcting memory, ([0151], [0160]). Examiner interprets acting on the images in real-time as indicative of performing a calculation on time-series data.

Gallagher, Suda, Nako, and Song are in the similar art of correcting image distortion (Gallagher, title, Suda, [0131], [0136], Nako, title, Song, title). It would have been obvious at the time of the invention to one of ordinary skill in the art to use the transforming unit on a time series, such as that taught by Song, with the apparatus disclosed by Gallagher and Suda and Nako, as video data is a common application for image analysis which would require processing multiple frames over a span of time.

Regarding claim 8, Gallagher and Suda and Nako disclose the image processing apparatus according to claim 1.

Gallagher and Suda and Nako do not explicitly disclose the distortion correcting range calculating unit calculates the input image range by sequentially repeating the range calculation with respect to a plurality of input signals for distortion correction processing.

Song et al. teach coordinates are successively updated based on which a distortion is corrected, and the process is repeatedly performed until the size of a scaled-up or scaled-down image is determined suitable to the screen ([0144]), and indicate multiple images ([0151], [0160]).

It would have been obvious at the time of the invention to one of ordinary skill in the art to use successive updating based on multiple images, such as that taught by Song, with the apparatus disclosed by Gallagher Suda and Nako, as this will help refine the processing for a variety of images with mildly varying distortion as would be found in video.

Regarding claim 9, Gallagher and Suda and Nako disclose the image processing apparatus according to claim 1.

Gallagher and Suda and Nako do not explicitly disclose the range calculation is performed repeatedly, and a correcting magnification M is determined such that an image range after distortion correction processing comes within a predetermined range with respect to the input image range.

Song et al. teach coordinates are successively updated based on which a distortion is corrected, and the process is repeatedly performed until the size of a scaled-up or scaled-down image is determined suitable to the screen ([0144]).

Regarding claim 10, Gallagher and Suda and Nako and Song et al. disclose the image processing apparatus according to claim 8. Song et al. further teaches a range calculation is performed repeatedly, and a correcting magnification M is determined such that an image range after distortion correction processing comes within a

predetermined range with respect to the input image range (coordinates are successively updated based on which a distortion is corrected, and the process is repeatedly performed until the size of a scaled-up or scaled-down image is determined suitable to the screen, [0144]).

Regarding claim 11, Gallagher and Suda and Nako disclose the image processing apparatus according to claim 1.

Gallagher and Suda and Nako do not explicitly disclose the distortion correcting range calculating unit calculates an input image range for next distortion correction processing during executing the distortion correction processing by the distortion correcting unit.

Song et al. teach a distortion parameter is successively updated until it converges to an accurate distortion parameter ([0111]). This indicates the results of the current distortion processing affects the next distortion processing.

9. **Claim 7 is** rejected under 35 U.S.C. 103(a) as being unpatentable over Gallagher (US 2003/0215230 A1) and Suda (US 20020122124 A1) and Nako (US 5940544 A) as applied to claim 1 above, further in view of Suzuki et al. (US 6801671 B1).

Regarding claim 7, Gallagher and Suda and Nako disclose the image processing apparatus according to claim 1.

Gallagher and Suda and Nako do not explicitly disclose the coordinate generating unit obtains coordinates by performing predetermined thinning-out processing with respect to the interpolation coordinates for distortion correction processing.

Suzuki et al. teach, “In the case of reduction, in order to prevent such processing from causing a deterioration in image quality, after interpolation of the pixel data is carried out by the reducing interpolation unit in accordance with the reduction ratio, the interpolated pixel data is thinned out by the reduction/enlargement unit and the image is reduced”, (col. 1, lines 45-55).

It would have been obvious at the time of the invention to one of ordinary skill in the art to combine the thinning out as taught by Suzuki et al. with the invention of Gallagher and Suda and Nako, as this is described by Suzuki et al. as part of conventional magnification processing (col. 1, lines 55-65), therefore this would have been a known way to perform this and would have predictable results.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHELLE ENTEZARI whose telephone number is (571)270-5084. The examiner can normally be reached on M-Th, 7:30am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571)272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michelle Entezari/
Examiner, Art Unit 2624

/VIKKRAM BALI/

Supervisory Patent Examiner, Art Unit 2624